

Medicinal and Aromatic Plants of Bhandal Range, Churah Forest Division, Chamba District, Himachal Pradesh

BY

RAJENDRA GUPTA¹

Central Indian Medicinal Plants Organisation, Lucknow

A systematic survey of Bhandal Forest Range of Churah Forest Division, Chamba Dt., H.P. reveals that some 15 plant species are regularly exploited in varying quantities for export outside the district; an additional 44 species are collected on a limited scale either on orders from outside or for local use. The edapho-climatic conditions available in the district are suitable for commercial cultivation of a large number of drugs and perfumery raw materials, which continue to be imported into the country.

INTRODUCTION

Chamba district, located in the extreme North-West of Himachal Pradesh amidst the Western Himalayas, is one of the traditionally rich districts for vegetable raw materials, where a sizable quantity of drugs and perfumery raw materials are collected and marketed annually. The whole district is hilly, traversed by two parallel lofty ranges of the Dhauladhar and Zanskar, forming narrow valleys, that are criss-crossed by fast running streams. The district has hitherto remained largely inaccessible because of difficult terrain and lack of communications. A few well known plant taxonomists (Watt, G. in 1881; Gammie, G. A. in 1898; Burkill, I. H. and others) have travelled in the district, mostly on plant collection trips, but the distribution and occurrence of medicinal and aromatic plants have usually been dealt by them in very general terms. A need for detailed survey has long been felt and the Himachal Pradesh Administration formulated a programme of resources survey work under the aegis of the State Forest Deptt. in its second Five Year Plan. This survey work was conducted by the author. The district, for convenience of the Forest Administration, is divided into two units, Chamba and Churah Forest Divisions, while a third one called Pangil-Lahoul Division, has recently been created out of the latter. The first survey report covering Chamba Forest Division has been published

¹Formerly Minor Forest Produce Officer, Chamba Circle, Himachal Pradesh, Dalhousie.

(Rajendra Gupta 1964). The Bhandal Forest Range is the richest range of the Churah Forest Division and its survey report is presented here.

The Bhandal Forest Range is of comparatively easy terrain, 241 sq. km. in area and abounding in magnificent pine forests. It is a narrow strip of mountainous land running from south-west to north-east of the district and rising up to 4500 m. above sea level. It forms the North and North Western part of the Chamba district, bordering the Bhadarwah district of Jammu and Kashmir State; Tissa, Tikri and Lower Chamba Forest Ranges form its north-east, east and south-east boundaries, while its southern boundary runs along the Ravi River. The whole range is traversed by perennial, fast running streams in narrow valleys and the drainage is directed mainly towards south-east in the Siul River, which joins the Ravi, only a few miles north-west of Chamba town. A fair weather 'jeepable' road runs from Chamba to Kilor, a distance of about 35 km., the rest of the area is served by bridle and foot-paths.

The structural features of the area fall in line with the geological characteristics of the North-Western Himalayas. Siwalik zone is absent. The mountain ranges are an extension of Dhauladhar Range, a part of Archean system of geological formation. The parent rock is both of igneous and sedimentary origin with massive granitic intrusions. The important rocks are gneisses, shales and schists; slate-stone is quarried at several places. Soil is deep, moist, clayey to clay-loam with abundant forest litter on easy northern slopes. Southern exposed slopes are usually dry, rather steep and with sparse vegetational cover.

CLIMATE AND VEGETATION

As most of the area falls between 1000 and 3000 m. above sea level, the climate of the range could be described as varying from sub-tropical to temperate. Spring months are cool and pleasant, summers are mild while winters are severely cold. Monsoon usually commences by the middle of July and continues till late September; the average rainfall is about 1500 mm. mostly during monsoon months. Above this zone, the climate is subalpine, where the average rainfall is over 2000 mm., a major portion of the precipitation here is received in winter months in the form of snow, which remains on the ground for about 5 months in a year; none of the peaks in the area remain snow-bound throughout the year.

According to vegetation types the range may be divided into three distinct zones :

(i) Sub-tropical Pine Forests

This type of vegetation is found in valleys up to 1200 m. elevation and constitutes only a negligible ten per cent area of the whole range.

Chil Pine (*Pinus roxburghii* Sargent) is the principal timber species and is mixed with a number of associate brush-wood species such as *Dodonaea viscosa* Linn., *Adhatoda vasica* Nees, *Prinsepia utilis* Royle, *Murraya koenigii* Spreng., *Punica granatum* Linn. etc. Tree species such as *Quercus glauca* Thunb., *Celtis australis* Linn., *Grevia oppositifolia* Roxb., *Ficus glomerata* Roxb., *F. roxburghii* Wall., *Cedrela toona* Roxb., and *Lannea grandis* Engl. occurs most frequently and are lopped heavily near habitations for feeding cattle.

(ii) Moist Temperate Forests

Higher above the sub-tropical pine forests and up to 3600 m. above sea-level is found the moist temperate forests. It consists of 35 reserved and 70 demarcated protected forests and thus covers a large portion of about seventy per cent area of the range. The reserved and protected forests are an important source of valuable coniferous timber species. It has deodar [*Cedrus deodara* (Roxb.) Loud.] Kail or Blue Pine (*Pinus wallichiana* A. B. Jackson), Fir [*Abies pindrow* Spach. and *A. spectabilis* (D. Don) Spach.] Tosh (*Picea morinda* Link), in abundance. Two species of Oak, Moru Oak (*Quercus dilatata* Lindl.) at the lower height and Kharsu Oak (*Quercus semicarpifolia* Smith) in the higher zone are fairly common. Mixed with the pine and oak forests are found scattered broad-leaf tree species of *Acer*, *Aesculus*, *Alnus*, *Ilex*, *Taxus*, *Fraxinus*, *Cornus*, *Prunus*, *Pieris* (*ovalifolia*), *Rhododendron* etc. *Betula utilis* D. Don forms the tree line. The ground canopy is rich and composed of a number of shrub species; some of the more common genera are *Berberis*, *Myrsine*, *Spirea*, *Indigofera*, *Buddleia*, *Lonicera*, *Viburnum*, *Cotoneaster*, *Desmodium*, *Rosa*, *Impatiens*, *Echinops*, *Strobilanthes*, *Polystachya*, *Plectranthus* and *Artemisia* etc. Plants of *Bergenia*, *Platystemma* and *Begonia* are abundant on moist rocky slopes. The herbal flora is equally rich and varied, and completely covers the ground, more particularly during and after the rains.

(iii) Sub-Alpine Grass-Lands

The sub-alpine grass-lands or *dhars* lie just above the tree line and constitute a fairly large and important part of the range. During summer and till late September this region supports large herds of cattle. The flora of these pastures is far more varied and colourful. Shrub species are comparatively rare, of which *Rosa*, *Rhododendron*, *Spirea*, *Cotoneaster*, and *Salix* are the common ones—all of which show a spreading habit. The common herbal flora is dominantly made of species belonging to *Aconitum*, *Geranium*, *Gentiana*, *Trifolium*, *Swertia*, *Rumex*, *Podophyllum*, *Polygonum*, *Polygonatum*, *Artemisia*, *Arisaema*, *Anemone*, *Potentilla*, *Impatiens*, *Ranunculus*, *Caltha*, *Codonopsis*, *Corydalis*, *Viola*, *Valeriana*, *Fragaria*, *Elsholtzia*, *Achillea*, *Anaphalis*, *Gnaphalium*, *Delphinium*, *Meconopsis*, *Sedum*, *Spiranthes*, *Pedicularis*, *Primula*, *Lilium*,

TABLE 1
CHEMICAL ASSAY OF SOME DRUGS AND AROMATIC PLANTS OCCURRING IN BHANDAL RANGE

Name	Locality and time of collection	Drug part	Active principle* (at zero moisture)
<i>Atropa acuminata</i>	Bhaint Reserve, September 1960	Leaves and root	Total alkaloids: Leaves 0.38% Roots 0.6%
<i>Aconitum chasmanthum</i>	Gungul, Sept. 1960	Tuber	Total alkaloids 4%
<i>Dioscorea deltoidea</i>	(1) Bhaint Reserve (2) Langera Reserve, Sept. 1960	Tuber	3 to 6% diosgenin content.
<i>Podophyllum hexandrum</i>	(1) Bhadiroh-nalla (2) Bhandal Reserve, Sept. 1960	Rhizome & roots	Total resin: 9 to 11%
<i>Cedrus deodara</i>	Kilor Reserve, September 1960	Wood-chips	Essential oil 0.2% w/w (Fresh material)
<i>Jurinea macrocephala</i>	Ban-da-got, October 1959	Rhizome	Chloroform extractive 58%
<i>Skimaea laureola</i>	Kilor beat, September 1960	Leaves	Essential oil 2.10%
<i>Salvia mborcroftiana</i>	Bhandal beat, September 1960	Root	Essential oil 1%
<i>Selinium veginatum</i>	Gungul, September 1960	Rhizome & roots	Essential oil 1.3 to 1.8%
<i>Valeriana wallitchii</i>	Bhandal beat, October 1959	Rhizome and roots	Essential oil 1 to 1.2%

*Range of the active principle is given wherever two or more samples are examined.

Jurinea and *Taraxacum* including those belonging to sedges and grasses. A large number of other herb species, too, are found either scattered or localised at some places in the range. A number of medicinal and aromatic plant species grow abundantly in this region some of which are regularly collected and exported outside the State. The collection, sale and export of medicinal and aromatic plant material is governed by Chamba Minor Forests Produce Act 2003(S).

FLORISTICS

The floral composition of the range compares favourably with the species recorded under similar ecological conditions of the North-Western Himalayas. Deodar, fir and spruce form almost single species plant communities. The growth of deodar is exceedingly good; lofty large trees are a common feature of the reserve forests. The ground canopy is thick and varied. Compositae, Labiatae, Ranunculaceae, Scrophulariaceae, Berberidaceae and Liliaceae are well distributed in the range, each represented by a large number of species. With the melting of snow the sub-alpine grass-lands resume vegetative activity and the whole ground is covered with green in about a month's time. As these plants complete their life cycle in a few months, they come to bloom early adding brilliant, very colourful touches to the landscape. Yellow in all its shades, followed by pink are the dominant colours, a spectacular contrast to the green surroundings.

The medicinal and aromatic plants of the region are described in this report under two categories, based upon their market demand and value. While the survey work has been done catchment-wise, the names of forest-beats and dhars have been given in the report to facilitate easy location for later collection. Marketable drugs are treated in some detail so far as their locality and distribution is concerned while for the remaining plant species only the frequency of occurrence, zonal distribution and local uses are recorded.

MARKETABLE DRUGS AND AROMATIC PLANTS

In all 15 plant species are found to grow in this range which possess consistent market demand and fetch a fair price. These are described below alphabetically. Forty-four plant species are found to be collected on a limited scale; uses and distribution are incorporated in Table 2 appended to this paper. Representative samples of a few of the drug and aromatic plant species from areas, where they are commercially collected or where commercial collection is possible, have been analysed chemically for active principles. The result of the assay is reproduced in Table 1.

TABLE 2

PLANTS HAVING LIMITED OR LOCAL DEMAND

S. No.	Latin Name	Local name	Distribution
1.	<i>Abies webbiana</i> Linn.	Talispatra	Frequents higher reaches of moist temperate forests.
2.	<i>Abutilon indicum</i> (Linn.) Sw.	Kanghi	Common, sub-tropical pine forests.
3.	<i>Achillea millefolium</i> Linn.	Gandhana	Abundant, sub-alpine dhars.
4.	<i>Achyranthes aspera</i> Linn.	Putkanda	Common, sub-tropical pine forests.
5.	<i>Adhatoda vasica</i> Nees	Basuti	Abundant, sub-tropical pine forests.
6.	<i>Agave angustifolia</i> Haw.	Ramban	Frequent, sub-tropical pine forests.
7.	<i>Ajuga bracteosa</i> Wall. ex Benth.	Nilkanthi	Abundant, moist temperate forests.
8.	<i>Arisaema flavum</i> Schott	Sarp-chalii	Common, in moist temperate forests.
9.	<i>Artemisia vulgaris</i> Linn.	Charmari	Abundant, moist temperate forests.
10.	<i>Asparagus racemosus</i> Willd.	Sansarpod	Common, sub-tropical pine forests.
11.	<i>Berberis aristata</i> DC., and other sp.	Rasaunt	Common in moist temperate forests. Roots yield 'rasaunt' of commerce.
12.	<i>Betula utilis</i> D. Don	Bhojpatra	Common, forms last tree line in moist temperate zone.
13.	<i>Boerhaavia diffusa</i> Linn.	Punarnava	Frequent, sub-tropical pine forests.

14. <i>Boenninghausenia albiflora</i> Reichb.	Pissumar	Common in moist temperate forests.
15. <i>Cassia occidentalis</i> Linn.	Pawar	Common in village waste lands.
16. <i>Celastrus paniculatus</i> Willd.	Malkangni	Rare, sub-tropical pine forests.
17. <i>Cissampelos pareira</i> Linn.	Patha	Common, sub-tropical pine forests.
18. <i>Cymbopogon nardus</i> (Linn.) Rendle	Makira-ghas	Frequent, sub-tropical pine forests.
19. <i>Datura metel</i> Linn.	Kala dhatura	Rare, sub-tropical pine forests.
20. <i>Fumaria parviflora</i> Linn.	Pitpapra	Common on agricultural lands or near villages.
21. <i>Geranium wallichianum</i> D. Don	Ratmundi	Abundant, moist temperate forests.
22. <i>Inula royleana</i> DC.	Puskar mool	Rare in sub-alpine dhars.
23. <i>Juniperus communis</i> Linn.	Bithar	Common, sub-alpine dhars.
24. <i>Litsea glutinosa</i> (Lour.) Rob- bins	Hadran	Rare, moist temperate forests.
25. <i>Murraya koenigii</i> Spreng.	Gandhelu	Common, sub-tropical pine forests.
26. <i>Myrsine africana</i> Linn.	Baibidang	Rare, sub-tropical pine forests.
27. <i>Nasturtium fontanum</i> Aschers.	Nalachu	Common in running water. Plant possesses fatty oil.
28. <i>Origanum vulgare</i> Linn.	Mirjanjosh	Rare, lower sub-alpine dhars. Possesses essential oil.
29. <i>Pedaliium murex</i> Linn.	Bara gokhru	Rare, sub-tropical pine forests.
30. <i>Peristrophe bicabculata</i> Nees	Kak-jangha	Common, sub-tropical pine forests.

TABLE 2

PLANTS HAVING LIMITED OR LOCAL DEMAND

S. No.	Latin Name	Local name	Distribution
1.	<i>Abies webbiana</i> Linn.	Talispatra	Frequents higher reaches of moist temperate forests.
2.	<i>Abutilon indicum</i> (Linn.) Sw.	Kanghi	Common, sub-tropical pine forests.
3.	<i>Achillea millefolium</i> Linn.	Gandhana	Abundant, sub-alpine dhars.
4.	<i>Achyranthes aspera</i> Linn.	Putkanda	Common, sub-tropical pine forests.
5.	<i>Adhatoda vasica</i> Nees	Basuti	Abundant, sub-tropical pine forests.
6.	<i>Agave angustifolia</i> Haw.	Ramban	Frequent, sub-tropical pine forests.
7.	<i>Ajuga bracteosa</i> Wall. ex Benth.	Nilkanthi	Abundant, moist temperate forests.
8.	<i>Arisaema flavum</i> Schott	Sarp-chalii	Common, in moist temperate forests.
9.	<i>Artemisia vulgaris</i> Linn.	Charmari	Abundant, moist temperate forests.
10.	<i>Asparagus racemosus</i> Willd.	Sansarpod	Common, sub-tropical pine forests.
11.	<i>Berberis aristata</i> DC., and other sp.	Rasaunt	Common in moist temperate forests. Roots yield 'rasaunt' of commerce.
12.	<i>Betula utilis</i> D. Don	Bhojpatra	Common, forms last tree line in moist temperate zone.
13.	<i>Boerhaavia diffusa</i> Linn.	Punarnava	Frequent, sub-tropical pine forests.
14.	<i>Boeninghausenia albiflora</i> Reichb.	Pissumar	Common in moist temperate forests.
15.	<i>Cassia occidentalis</i> Linn.	Pawar	Common in village waste lands.
16.	<i>Celastrus paniculatus</i> Willd.	Malkangni	Rare, sub-tropical pine forests.
17.	<i>Cissampelos pareira</i> Linn.	Patha	Common, sub-tropical pine forests.
18.	<i>Cymbopogon nardus</i> (Linn.) Rendle	Makira-ghas	Frequent, sub-tropical pine forests.
19.	<i>Datura metel</i> Linn.	Kala dhatura	Rare, sub-tropical pine forests.
20.	<i>Emmaria parviflora</i> Linn.	Pitpapa	Common on agricultural lands or near villages.
21.	<i>Geranium wallichianum</i> D. Don	Ratmundi	Abundant, moist temperate forests.
22.	<i>Junla royleana</i> DC.	Puskar mool	Rare in sub-alpine dhars.
23.	<i>Juniperus communis</i> Linn.	Bithar	Common, sub-alpine dhars.
24.	<i>Litsea glutinosa</i> (Lour.) Robins	Hadran	Rare, moist temperate forests.
25.	<i>Murraya koenigii</i> Spreng.	Gandhelo	Common, sub-tropical pine forests.
26.	<i>Myrsine africana</i> Linn.	Baibidang	Rare, sub-tropical pine forests.
27.	<i>Nasturtium fontanum</i> Aschers.	Nalachu	Common in running water. Plant possesses fatty oil.
28.	<i>Origanum vulgare</i> Linn.	Mirjanjosh	Rare, lower sub-alpine dhars. Possesses essential oil.
29.	<i>Petalium murex</i> Linn.	Bara gokhru	Rare, sub-tropical pine forests.
30.	<i>Peristrophe bicalyculata</i> Nees	Kak-jangha	Common, sub-tropical pine forests.

S. No.	Latin Name	Local name	Distribution
31.	<i>Plumbago zeylanica</i> Linn.	Safed Chitrak	Common, sub-tropical pine forests.
32.	<i>Punica granatum</i> Linn.	Anar	Common, sub-tropical pine forests. The dried ripe fruits are marketed for use as spices.
33.	<i>Royalea elegans</i> Wall.	Kaur	Rare, sub-tropical pine forests.
34.	<i>Rubia cordifolia</i> Linn.	Majitha	Frequent, moist temperate forests.
35.	<i>Selinium vaginatum</i> Linn.	Bhutkesi	Common, moist temperate forests.
36.	<i>Skinimia laurcola</i> S. & Z. ex Walp.	Kastura Pati	Common in shade in moist temperate forests. Leaves possesses an aromatic oil. According to local belief the plant is eaten by musk-deer.
37.	<i>Rhododendron campanulatum</i> Linn.	Chue	Common, sub-alpine dhars, leaves used as nasbar.
38.	<i>Solanum indicum</i> Linn.	Kandyan	Common, sub-tropical pine forests. Root enters into Dashmool—a widely used prescription in Ayurvedic medicine.
39.	<i>S. nigrum</i> Linn.	Makoi	
40.	<i>S. xanthocarpum</i> Schrad. & Wendl.	Badikateri	
41.	<i>Taraxacum officinale</i> Wigg.	Dudhli	Common, sub-alpine dhars.
42.	<i>Thalictrum foliolosum</i> DC.	Mamiri	Common, moist temperate forests.
43.	<i>Vitex negundo</i> Linn.	Nirgundi	Abundant, sub-tropical pine forests. Leaves contain an essential oil.
44.	<i>Zanthoxylum alatum</i> Roxb.	Titiri	Rare, along streams and most localities in sub-tropical pine forests. Seed aromatic, contains an essential oil.

1. **Aconitum heterophyllum** Wall. (*Mitha Patis*, Ind. baz. *Atis*).

A small perennial herb with orbicular to reniform leaves and blue flowers. Tuber medicinal, used as a febrifuge and bitter tonic in indigenous medicine. It is common in sub-alpine grass-lands and is collected on a small scale from Kihar-Madralla, Nakru, Khornu-Talai, Desot, Gulu-ki-Mandi, Ban-da-got, Raja-da-dera dhars.

2. **A. chasmanthum** Stapf ex Holmes (*Kaura-Patis* Ind. baz. *Patisa*).

A small perennial herb with orbicular to reniform leaves and blue flowers. The plant is found in sub-alpine grass-lands. Tuber is medicinal, regarded as substitute of English Aconite. It is collected on a small scale from areas listed above.

3. **Atropa acuminata** Royle ex Lindley (*Jharka*, Ind. Baz. *Belladonna*).

A tall, branched perennial herb with dull yellow flowers and purple berries. The leaves and roots are official drugs and yield belladonna alkaloids having a large market demand. It is found sporadically distributed in deodar forests, but regular commercial collections, are now not possible, because the areas have been heavily and regularly exploited in past years.

The temperate deodar forests are ideally suited for its large scale introduction in the range. Experiments done on raising plantations by the author (1968) elsewhere in the district, have given very encouraging results both in respect to yield of crude drugs as well as the percentage of active principles contained in the cultivated plants.

4. **Bergenia ligulata** (Wall.) Engl. (*Saprotri*, Ind. baz. *Pashan bhed*, *Abe-hayat*).

A spreading, shade loving creeper on moist rocky localities. In Ayurvedic and Unani medicines, its root is used in pulmonary affections and also as a medicine for removing stones from affected kidneys. It has *bergenin* as its active principle.

The plant is abundant in upper reaches of the moist temperate forests but no commercial collections of the roots are made.

5. **Cedrus deodara** (Roxb.) Loud.

Deodar trees, a valuable timber species, are abundantly found in the range in its reserve and protected demarcated forests. These are annually auctioned and timber is extracted. The wood-chips and shavings that are left at site are not put to any use. The fresh wood-chips and saw-dust from this species, on steam distillation, yield an aromatic oil which resembles in essential characteristics the Atlas Cedar-wood oil marketed in Europe and America. The Cedar-wood oil is employed in soap perfumery and a small quantity of this oil is produced in Kashmir only. The Bhandal Range could be profitably exploited for production of this

oil and movable distillation units could be fabricated and employed to distill the wood-chips and shavings at site where timber exploitation work is in progress so as to keep the cost of production low.

Chamba district in general is in a position to support a small scale industry for production of the Himalayan cedar-wood oil at competitive price in the State.

6. **Dioscorea deltoidea** Wall. (Kniss)

A climbing perennial herb, bearing small white flowers in June-July, is found to grow between 1600 and 2500 m. above sea level. Its tubers yield *diosgenin*—a starting raw material for production of cortisone. There is an ever increasing demand of this raw material by the Pharmaceutical industry. The plant is available in commercial quantities in reserve and protected temperate forests of Baint and Langera beats.

The medicinal virtues of this plant are not known to the local population, who use it for washing their woollen garments because of the presence of *Saponins* in the tuber.

7. **Gentiana kurroo** Royle (Kaur)

A small perennial herb with tufted stem and sky blue flowers, common in alpine grass-lands. Root-stock is cylindrical, used in medicine, sometimes as a substitute of Gentian root of the British Pharmacopoeia. Collections on a small scale are made from Bhandal, Kilor and Langera beats.

8. **Jurinea macrocephala** Benth. (Dhoop).

A small perennial herb, devoid of stem and with large radical raddish-like leaves, that lie on the ground forming a rosette. The flowers are borne in composite heads, purple to purplish white in colour and arising almost in the centre of the rosette. As the peduncle is shortened to the extent of being almost absent, the inflorescence appears as a bunch of rosy flowers arranged on a green oval plate. The plant is found in open alpine grass-lands, at an elevation of 3500 m. or above, and is gregarious wherever it grows.

Roots large, cylindrical and contain a sticky substance, which is chemically a catechu like material. It yields the famous *dhoop* material which is burnt as incense at ceremonies and in temples. Commercial collections of roots are made regularly from Supa-Cholu, Kihar Madrala, Khirnu-Talai, Maral, That-Kihar, Sawan-Tith, Ban-da-got and Dhangi dhars.

9. **Pinus roxburghii** Sargent (Chil pine).

P. wallichiana A. B. Jackson (Blue pine, Khail).

Picea morinda Link (Tosh).

These species are so abundant, that each constitutes a dominant

part of important reserve forests; the leaves contain a sweet smelling, aromatic oil easily extractable on steam distillation. Like deodar oil, the pine needle oil too could be produced on commercial scale from the raw materials available in this range. This oil is used and marketed mainly as a deodorant. However, it is not produced anywhere in India on a sizable scale.

10. **Podophyllum hexandrum** Royle (Ban kakru, Ind. Baz. *Ban-kakri*).

An erect perennial herb with two large radical leaves and solitary fugitive white flower. The plant is common in moist temperate forests. Its rhizome and roots yield a resin, used in medicine. Lately, it is regarded to have anti-cancer properties and some firms have been organising cultivation of this species in Kashmir and Nilgiri Hills in India.

Commercial collections are regularly made from Bhadroh nalla area, Chandi-dhar in Kilor beat, Matanu dhar and Supa Cholu dhar in Langera beat, as also on small scale in Gumgul, Ban-da-got and Madrala dhars in Bhandal beat.

11. **Polygonum verticillatum** All. and **P. multiflorum** A. (*Salam misra*).

Small erect perennial herbs, with star-like flowers and cylindrical, white root, which is sweet in taste. Root medicinal, a well known nerve tonic in Ayurvedic medicine. It is collected on a small scale from areas given under item 10 above.

12. **Swertia chirata** Buch.-Ham. (*Chirata*, Ind. Baz. *Chirayata*).

A large branched, annual herb with greenish yellow flowers. It is common on alpine grass-lands. The extract of aerial part is a reputed Ayurvedic medicine against periodical fever.

The collection of genuine plant material is not feasible economically as allied species, (*S. angustifolia* Buch.-Ham., *S. alata* Royle etc.) medicinally inferior to it, are very frequently found mixed with it and are not easily distinguishable in the field. So the material generally sold in the market, is a mixture of a number of *Swertia* species.

13. **Salvia moorcroftiana** Wall. (Thuth).

A small perennial herb with cylindrical root and lilac flowers. It is common throughout the moist temperate forests. Despite the fact that the plant is available in commercial quantities in most of the beats, its market price is neither consistent nor good enough to attract large scale collection. The root is aromatic and yields a spicy oil on steam distillation.

14. **Valeriana wallichii** DC. (*Samak*, Ind. baz. *Musk-bala*).

A small erect herb with small lilac-white flowers. The plant is common in partial shade and is available in commercial quantities throughout the moist temperate forests. The rhizome and roots emit a pleasant,